

Réalité augmentée

Christophe Vestri

8 janvier 2019

Objectifs du cours

- Connaitre/approfondir la RA
- Avoir quelques bases théoriques
- Expérimenter quelques méthodes et outils
- Réaliser un projet en RA
- Evaluation:
 - Présence (20%)
 - Participation en classe (40%)
 - Projet (40%)

Plan du cours

- 8 janvier : Réalité augmentée intro, Unity/Vuforia et projet final
- 17 janvier: Construction RA + Notions 2D + HTML5 et JS + exercices JS
- 22 janvier: QRCode et Unity/vuforia
- 29 janvier: Vision par ordinateur et RA (openCV – exo C++)
- 5 février : et présentation des Projets
- **Suite: Cours Cartographie/JS/AR/VR**

Mon parcours

Christophe Vestri

vestri@3DVTech.com

DUT-Ingénieur-DEA-These

3DVTech

- Développement traitement image
- Bureau d'étude et conseil

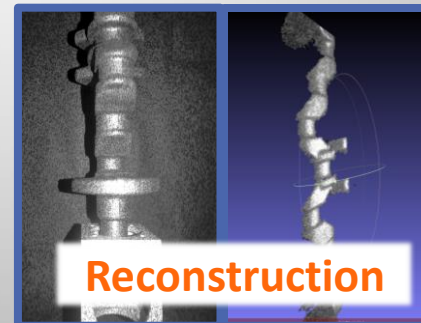
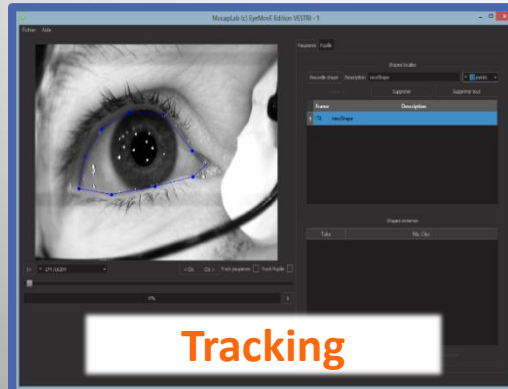
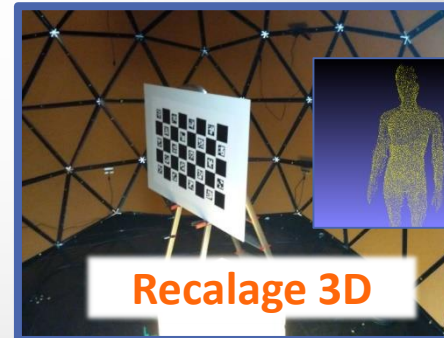
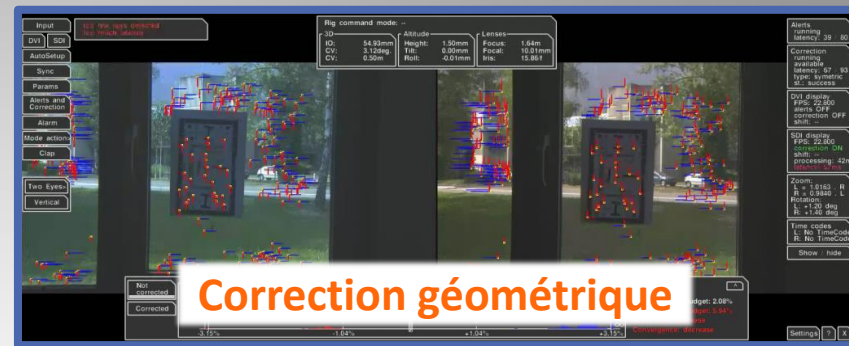
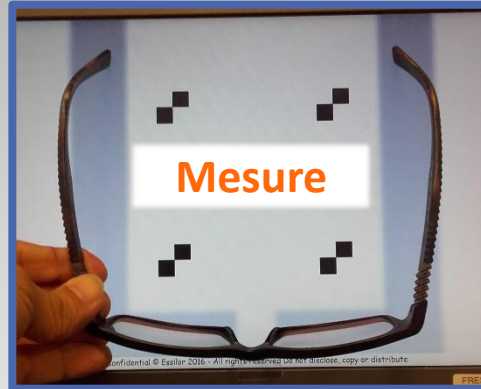
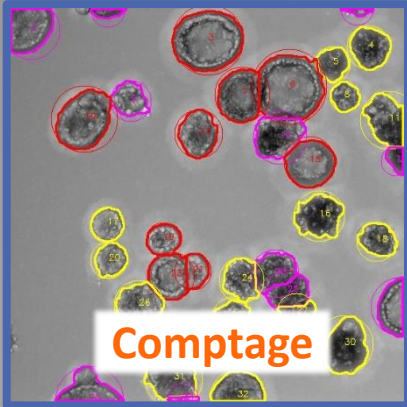
The logo for 3DVTech features the text '3DVTech' in a bold, sans-serif font. The '3D' is in orange, and the 'VTech' is in blue. The 'V' is stylized with a blue outline and an orange fill.

www.3DVTech.com

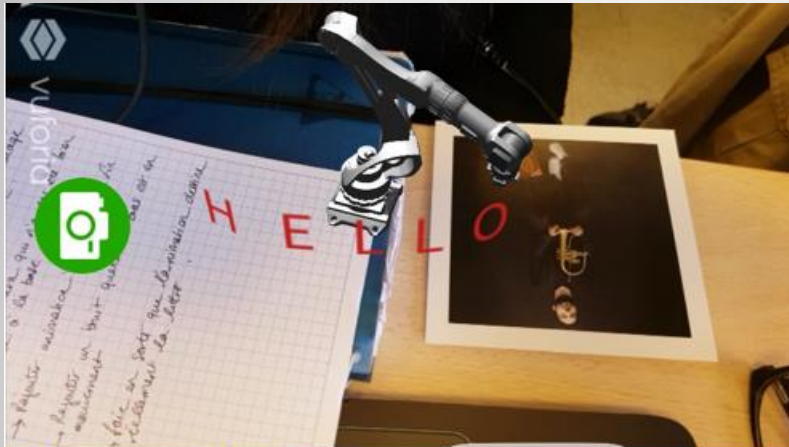
R&D Vision

Ingénieur Vision






Vous







Choisir la forme :

Sphère

Valider

Choisir la couleur de la forme :

orange

Valider

Entrer les paramètres de la forme :

Valeur 1 : 0.5

Valeur 2 : 15

Valeur 3 : 15

Valeur 4 : 8

Valider


Les informations de votre figure

Sphère

orange

0.5 15 15 8

Terminer



Réalité augmentée

Introduction

Christophe Vestri

Le mardi 28 février 2017

Plan Cours1

- Réalité augmentée
- Notions Images, 3D
- Projet ArtMobilib
 - 3 librairies JavaScript
 - 3 exercices
- Démo

Pokemon GO & Genesis



Qu'est-ce que la Réalité augmentée?

Qu'est-ce que la Réalité augmentée?

- Augmentée:
 - Amplifier
 - Rehausser
 - Améliorer
- [Wikipédia](#): La **réalité augmentée** désigne les systèmes informatiques qui rendent possible la superposition d'un modèle virtuel 2D ou 3D à la perception que nous avons naturellement de la réalité et ceci en temps réel.
- [RAPro](#) : Combiner le monde réel et des données virtuelles en temps réel

Continuum réalité-virtualité



Environnement
réel



Réalité
augmentée



Réalité
virtuelle



Environnement
virtuel



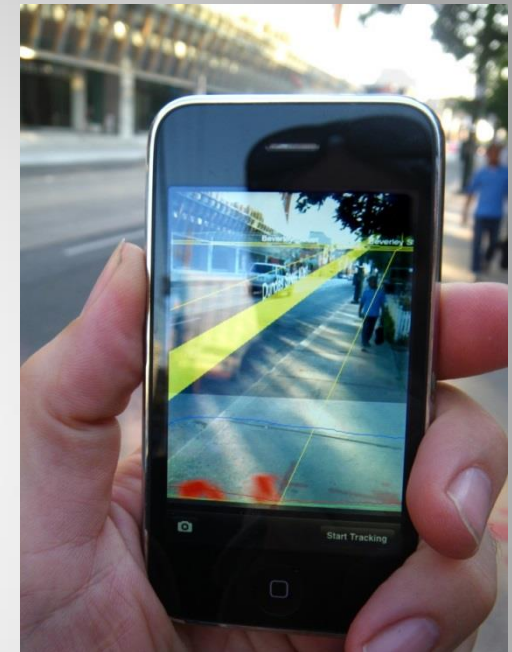
Qqs Demos et vidéos

- RayBan: <http://www.ray-ban.com/france/virtual-model>
- Sephora: <https://sephoravirtualartist.com/>
- <http://2010.joaopescada.com/projects/augmented-reality-demos/>
- <https://www.xzimg.com/Demo/Glasses>
- GoogleTraduction/Wordlens:
www.youtube.com/watch?v=06olHmcJjS0
- Autres videos.... HyperReality
- CES 2018/2019

Autre définition de la RA

- [RAPro](#) : Combiner le monde réel et des données virtuelles en temps réel
- 5 sens:
 - Visuel: smartphone, lunettes...
 - Sonore: déficients visuels
 - Tactile/haptique: systèmes retour de force
 - Odorat: Cinema 4D
 - Goût:

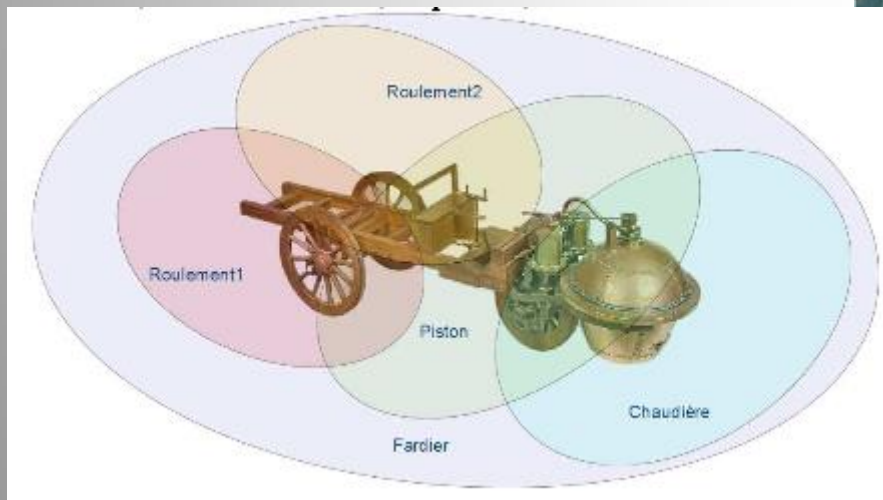
Exemples RA visuel



Exemples RA Sonore



Topophonie

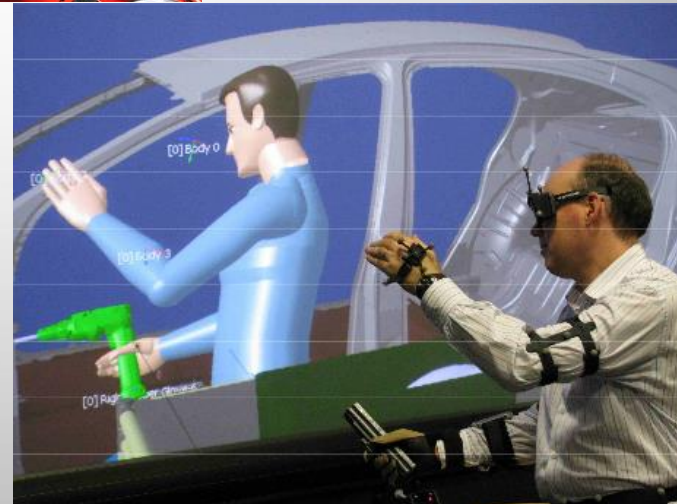


CNAM

Exemples RA Haptique



Sense-Roid



Haption

Examples RA Olfactive



AMBISCENT



Meta cookies

Exemples RA gustative



TagCandy



Applications

- Augmentation de print



IKEA 2014



Idée3com : Application Brisach Vision



Applications

- Manuels augmentés



Applications

- Urbanisme



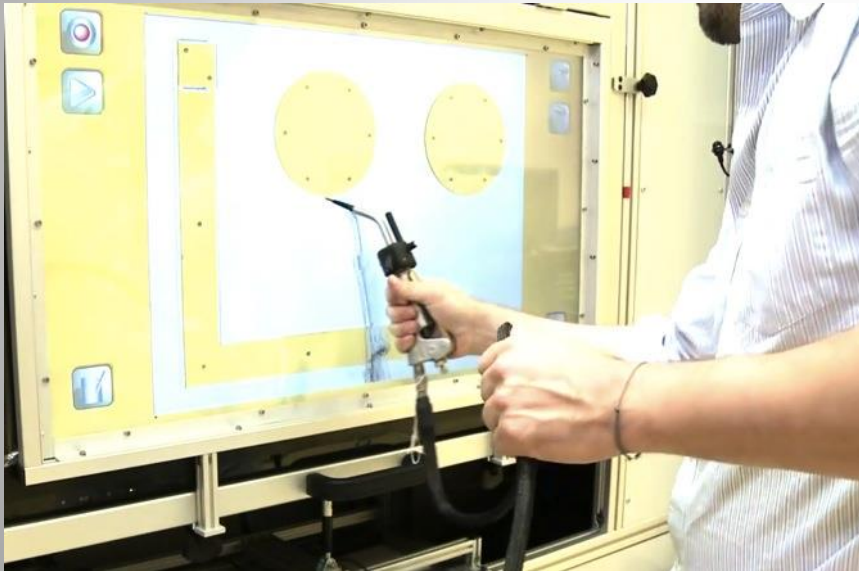
KRAKEN REALTIME



Métropole de Rennes

Applications

- Formation augmentée



CEA list & Renault : gestes techniques collage



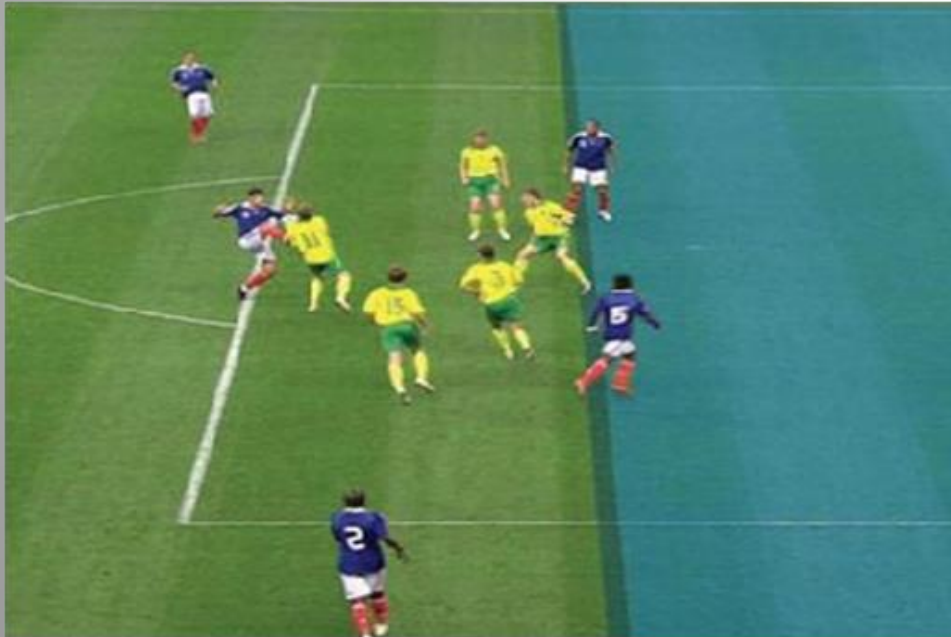
Institut de Soudure



Lincoln Electric

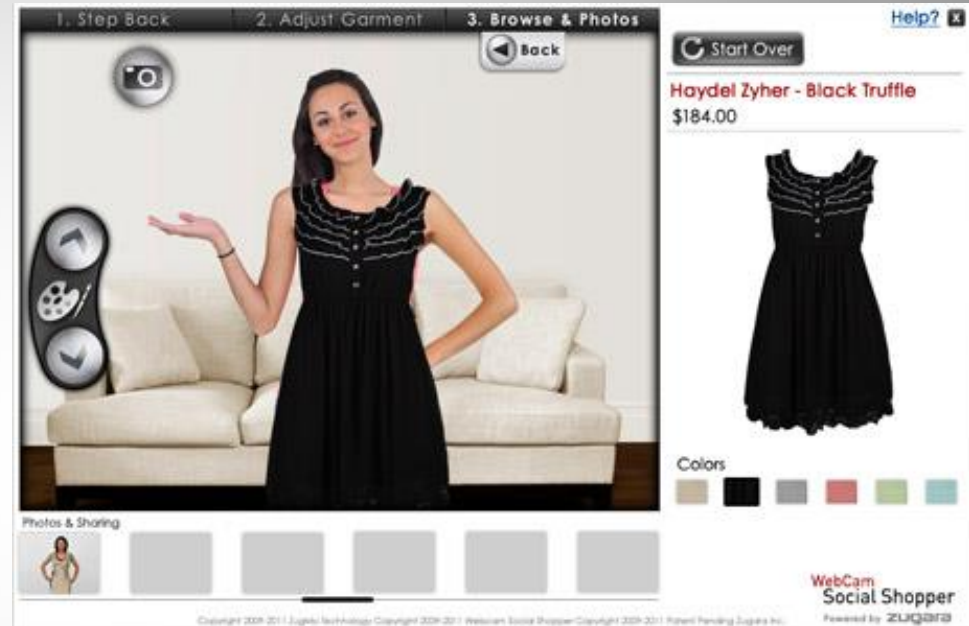
Applications

- TV



Applications

- Essayage sur internet



Applications

- Musées, art, tourisme



Museum d'histoires naturelles de Washington



MOMO urban art on the Williamsburg Art & Design Building in Brooklyn.



Applications

- Médical



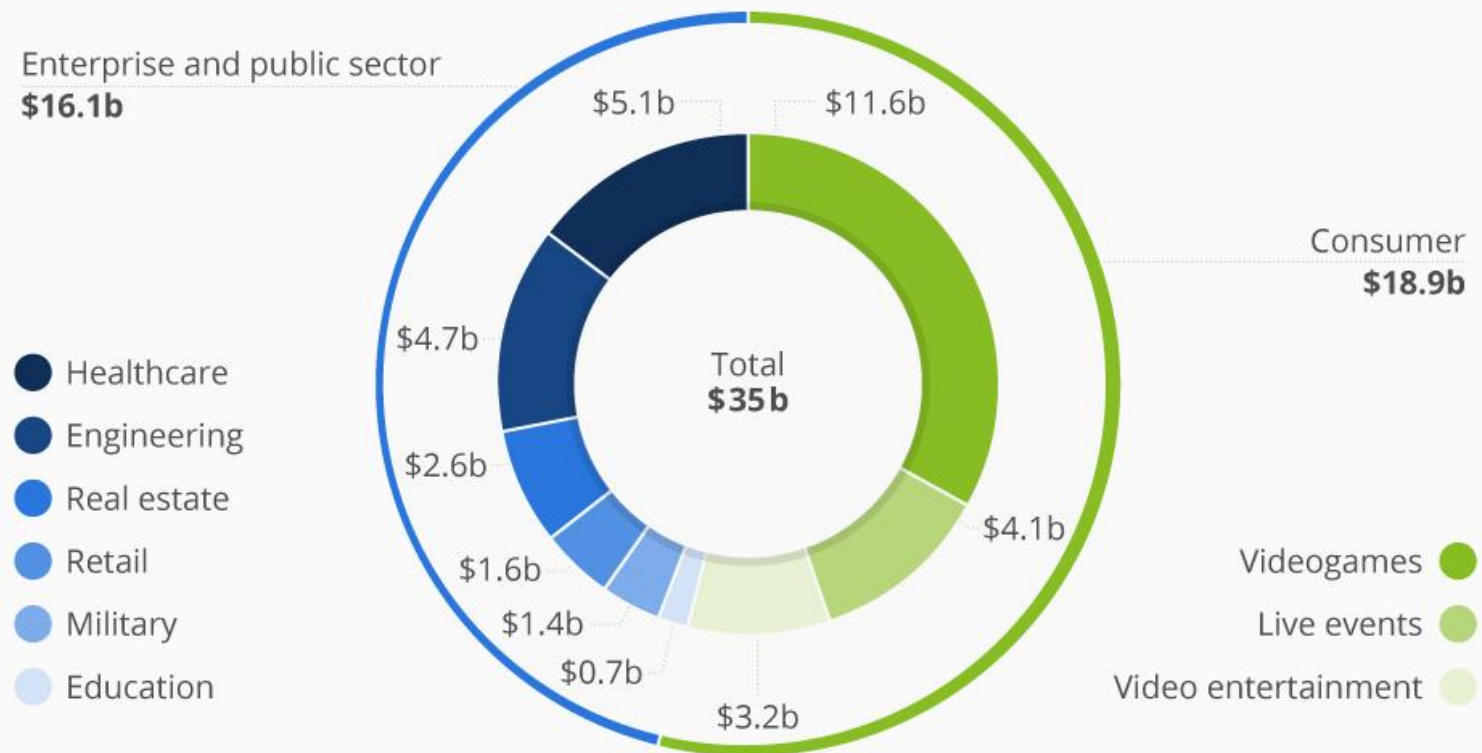
VeinViewer



Future Market

The Diverse Potential of VR & AR Applications

Predicted market size of VR/AR software for different use cases in 2025*



@StatistaCharts

* Base case scenario

Source: Goldman Sachs Global Investment Research






statista

Economie – AR Smart glasses

AR smart glasses in market or in advanced stages of development

\$1,000

median cost of AR smart glasses on the market

 Spectacles (60%)	 Headset (19%)
 Visor (12%)	 Goggle (7%)
 Helmet (2%)	

ANDROID DOMINANT OPERATING SYSTEM




Android (60%) Other (24%)
Microsoft (16%)

Android (60%) Other (24%)
Microsoft (16%)

PRIMARY MARKET IS THE ENTERPRISE

60%
of AR smart glasses
are intended for
commercial or
industrial purposes

 Boeing cut production time by 25% and reduced error effectively to zero using Google Glass in its wiring harness assembly

THE HOLY GRAIL OF AR: FIELD OF VIEW (FOV)

average AR smart
glasses FOV



Device	Percentage
Google Glass	15%
Recon Jet	16%
Epson BT300	23%
HoloLens	30%
DAGRI Helmet	40%
Aitheer AIR	50%
Meta 2	88%

FOV (degrees)

COMMON USER INTERFACES

48%



➤ **71%**

 79%

79%

FEATURES TO WATCH

CONNECTIVITY



DEPTH SENSOR



The Definitive Guide to Augmented Reality Smart Glasses is a living resource that contains up-to-date information on AR smart glasses that are on the market or in late stage development. This interactive infobase aims to help consumers and organizations in selecting the right device for their needs. Visit <http://ar4glassesguide.com/>

Sources

The Definitive Guide to AR Smart Glasses: <http://larglassesguide.com/>

APX: <https://apx-labs.com/landing/boe/na/>

Visit: <http://www.prnewswire.com/news-releases/vuzix-smart-glasses-will-be-key-2015-300471221.html>

component of a formal augmented reality program. 10513674

Windows: <https://www.windows.com/Windows/2016/08/15/microsoft-holiness-qa/06>

Author: Ron Padzensky

Published in partnership with:

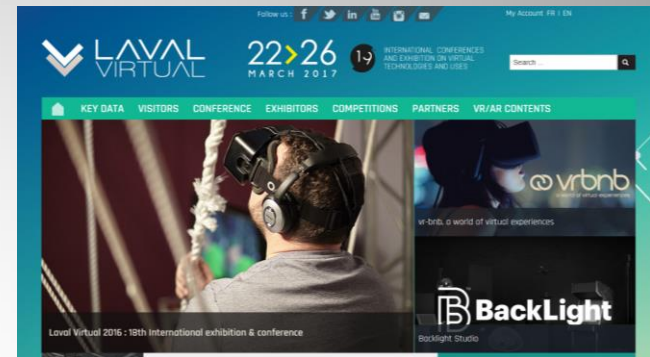
AugmentedReality.org & Super Ventures

Quelques entreprises 06

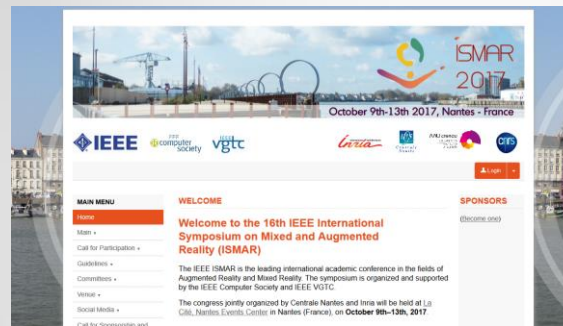
- **Robocortex:** SDK
- **Optis:** Image de synthèse et RV
- **Lm3labs:** interfaces interactives
- **Touchline Interactive:** Dev applis mobiles
- **Tokidev:** Dev applis mobiles
- **Wacan:** Dev applis mobiles
- **Interactive 4D:** Serious Games
- **Avisto:** SSII

Conférences et liens RA

- Laval Virtual



- ISMAR



- RAPro:

- <http://www.augmented-reality.fr/>



- AVFR:

- <http://www.af-rv.fr/>



Autres cours/infos

- Cours [Atelier IHM](#) de Nice
- Cours [Master IVI lille](#)
- Coursera: [Getting start with AR](#)
- Youtube et tutoriaux technos
- Udemy ([payants](#))

Outils de RA

- Metaio (-> Apple)
- [Unity](#) et [Vuforia](#) (features)
- [Wikitude](#) ([features](#))
- Été 2017: [ARCore](#) et [ArKit](#)
- Autres: [ARToolkit](#), [Sumerian](#), [AR.js](#), [Argon.js](#)
- Liste SDK liste: [Social Compare-AR-Sdk](#)
- Lunettes RA: [Social Compare-AR-lunettes](#)

Vision par ordinateur et RA

- Camera -> vision par ordinateur
- Plusieurs technologies
 - Détection de marqueurs spécifiques: coins, primitives naturels, carrés, ronds
 - Mise en correspondance: primitives, images
 - Reconnaissance d'image: monument, façade, visage
 - Reconnaissance d'objets: tables, chaise....
 - Recalage caméra: calcule de la pose
 - Traitement d'image: contraste, segmentation
 - Mixer image et synthétique

Pause

Projet final cours AR

- Objectifs:
 - 1 projet chacun avec AR inside
 - Outil que vous voulez: Unity, Vuforia, JS, Arcore, Arkit...
 - Présentation le dernier cours
- Planning
 - Trouver un sujet/idée en RA pour la semaine prochaine
 - Unity/vuforia cette semaine, JavaScript semaine prochaine

Tutoriaux et Idées projets

- Les sites Unity3D, Vuforia et autres sdk
- Chaines Youtubes AR
 - [MatthewHallberg](#)
 - [Edgaras Art](#) et <https://www.ourtechart.com/>
 - Et plein d'autres
- Chaines Unity3D
 - [N3K](#)

Unity et Vuforia

- Préparation du projet Final
 - Installation Unity et Vuforia
 - Test Vuforia ImageTarget
 - <https://library.vuforia.com/articles/Training/getting-started-with-vuforia-in-unity.html>
 - Développement d'une démo Monster/Start wars

Intro Vuforia

- [Vuforia](#)
- Examples [Vuforia In Unity](#)



Model Targets

Model Targets allow you to recognize objects by shape using pre-existing 3D models. Place AR content on a wide variety of items like industrial equipment, vehicles, toys and home appliances.

[Learn More](#)



Image Targets

Image Targets are the easiest way to put AR content on flat objects such as magazine pages, trading cards and photographs.

[Learn More](#)



Multi Targets

Multi Targets are for objects with flat surfaces and multiple sides, or that contain multiple images. Product packaging, posters and murals all make great Multi Targets.

[Learn More](#)



Cylinder Targets

Cylinder Targets enable you to place AR content on objects with cylindrical and conical shapes. Soda cans, bottles and tubes with printed designs are great candidates for Cylinder Targets.

[Learn More](#)



Object Targets

Object Targets are created by scanning an object. They are a good option for toys and other products with rich surface details and a consistent shape.

[Learn More](#)



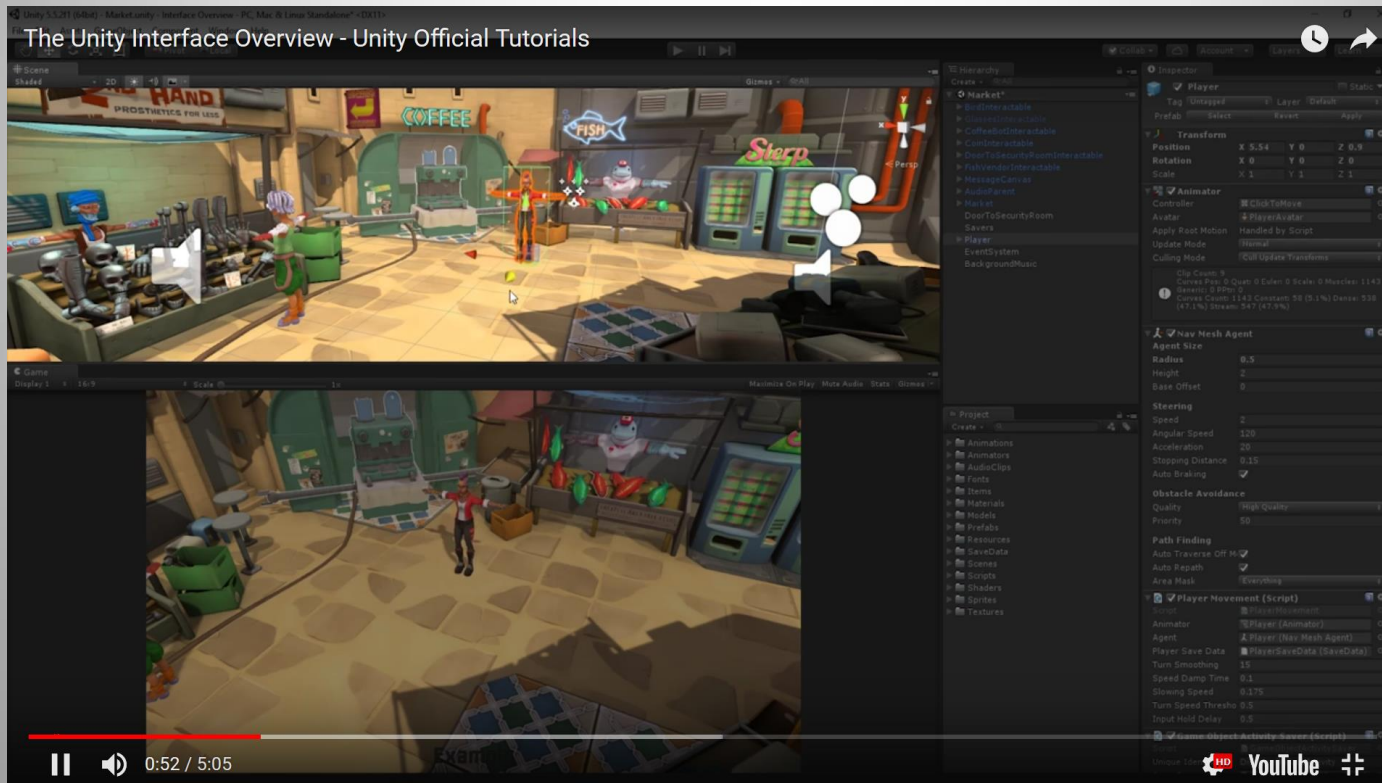
VuMarks

VuMarks allow you to identify and add content to series of objects. They're a great way to add information and content to product lines, inventory and machinery.

[Learn More](#)

Intro Unity3D

- Unity 3D
- AssetStore et Tutoriaux





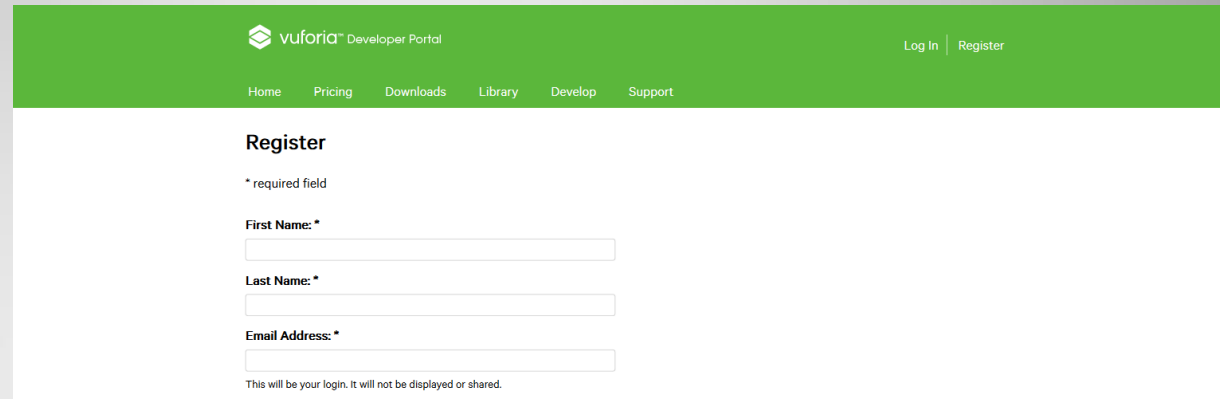
- Create Unity ID

A screenshot of the Unity ID creation form. At the top is the Unity logo and the text "Create a Unity ID". Below this is a sub-header: "A Unity ID allows you to buy and/or subscribe to Unity products and services, shop in the Asset Store and participate in the Unity community." The form contains several input fields: "Email", "Password" (with an eye icon for toggling visibility), "Username", and "Full Name". Below these is a "Country" dropdown menu with the text "Select country" and a downward arrow. At the bottom, there is a section titled "Click or touch the Cloud" with five icons: a game controller, a smartphone, a fingerprint scanner, a pair of scissors, and a cloud icon. To the right of the cloud icon are two small circular icons, one with a plus sign and one with a minus sign.

- Create a Project for the demo

Vuforia

- Register

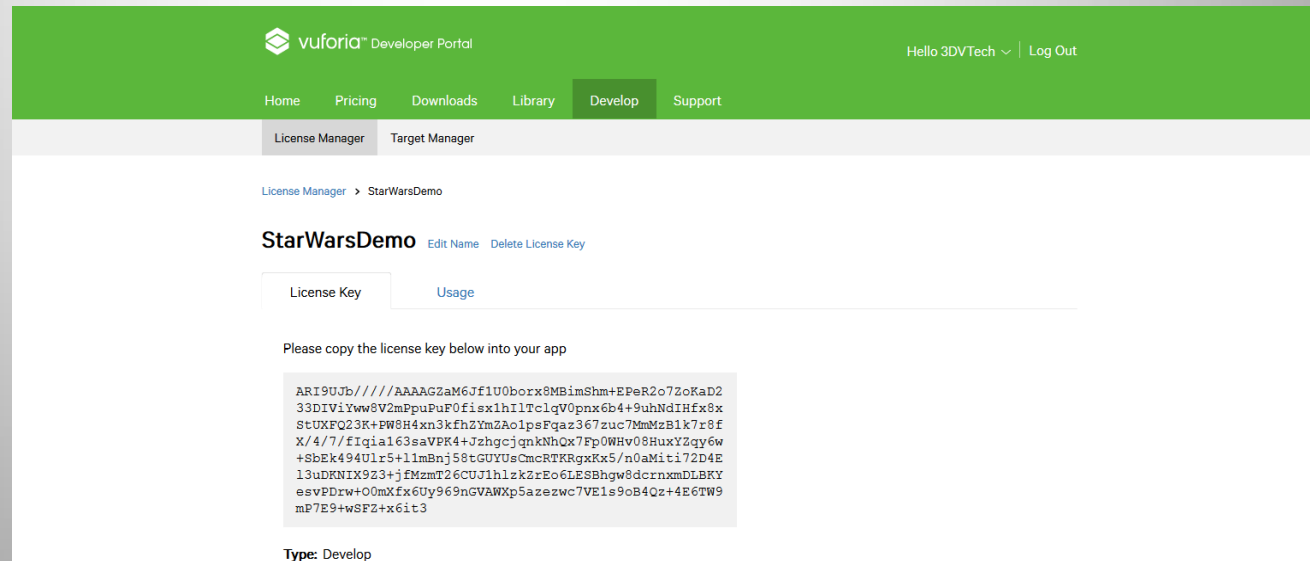


The screenshot shows the 'Register' page of the Vuforia Developer Portal. The header is green with the Vuforia logo and 'Developer Portal' text. Navigation links include Home, Pricing, Downloads, Library, Develop, and Support. The 'Register' page has a green header with 'Log In' and 'Register' links. The main content area is white and contains the following form fields:

- First Name: *** (text input)
- Last Name: *** (text input)
- Email Address: *** (text input)

Below the email field, a note states: "This will be your login. It will not be displayed or shared."

- Ask for an application license



The screenshot shows the 'License Manager' page of the Vuforia Developer Portal. The header is green with the Vuforia logo and 'Developer Portal' text. Navigation links include Home, Pricing, Downloads, Library, Develop, and Support. The 'License Manager' page has a green header with 'Hello 3DVTech' and 'Log Out' links. The main content area is white and contains the following elements:

- License Manager** (selected tab) and **Target Manager** (tab)
- StarWarsDemo** (selected license)
- License Key** (selected tab) and **Usage** (tab)
- Please copy the license key below into your app**
- License Key:** `ARI9UJb/////AAAAGZaM6Jf1U0box8MB1mShm+EPeR2o7ZoKaD233DIViYw8V2mPpuPuF0fisx1h1lTclqV0pnx6b4+9uhNdIHfx8xStUXFQ23K+PW8H4xn3kfzYmZaolpsFqaz367zuc7MmMzB1k7r8fX/4/7/fIqia163saVPR4+JzhgcjqnKnhQx7Fp0WHv08HuxYZqy6w+SbEk494U1r5+11mBnj58tGUYUsCmcRTKRgxKx5/n0aMiti72D4E13uDKNIX9z3+jfMzmT26CUJ1hlzk2rEo6LESBhgw8dcrnxmDLBKYesvPDrw+O0mXfx6Uy969nGVAWXp5azezwc7VE1s9oB4Qz+4E6TW9mP7E9+wSF2+x6it3`
- Type:** Develop

Pour la prochaine fois

- **Proposer un projet de RA**
- **Jusqu'à la fin du cours de RA pour le réaliser**
- **Techno au choix: Vuforia, JS, C++ (OpenCV)**

Pour la prochaine fois

- **Trouver idée de projet**
- **Continuer Unity**
 - **Unity3D**
 - **Vuforia for Unity**
- **On testera des outils javaScript et Unity**
- **Possibilité ARCore et ARkit ou autre**